# Technology Deployment Initiatives and Partnership Program
# Request for Funding
## FY 2002

**FHWA Strategic Goal Area:** Human and Natural Environment

**Project Title**: Sediment Flocculant Chitosan with Baker Tank Sand Filters

**Problem Statement**: Many projects have heavy sediment load in the runoff/drainage water due to construction impacts. All construction projects have required treatments for runoff flows including collection, settling ponds and fabric or straw filters. Much of the runoff is very fine particulate that is unable to settle into ponds due to the high rates of flow. Often this results in plume discharges of these fine particulates. Typically, runoff turbidity levels exceed 150 Nuephelometric Turbidity Units (NTU). These pond systems, even with fabric or straw filters, do not reduce the fine particulates substantially, resulting in discharges in excess of desired levels with observable silt discharge. An improved system is needed to treat and capture fine particulates before discharge. Resulting discharge turbidity levels closer to 1 NTU are desirable for protection of the environment, although there are no uniform standards for discharges relating to natural turbidity. A project water processing system consisting of a treatment and sand filtration show promise as a possible solution to this sediment discharge issue. Sediment laden water flowing from the construction site is directed to one or a series of settling/holding ponds. The ponds of appropriate size should have a water tight bottom and sides. From the pond, water is pumped using a submerged heavy duty (35hp) pump. As soon as the pumped water enters the pipe, a metered amount of Chitosan (Liqui-Floc) added. The Chitosan causes the fine sediment particles to bind together and this coagulant is subsequently removed with the sediment during sand filtration. Chitosan also removes phosphorous, heavy minerals, and oils from the water. Chitosan is a non-toxic, biodegradable substance made from shellfish; it is commonly used by aquariums to clean water and is safe for fish. The water is pumped from the pond into four silica sand filtration pods under 35psi pressure. The pods can filter an average of 475gpm, which includes a 2-minute backwash cleaning cycle every 10 minutes. The backwash water/sediment is sent back to the settling pond. The filtered water is pumped discharged to a suitable area where it can infiltrate into the ground.

**Proposal**: On a suitable project, with a critical sediment discharge problem, rent a system that can meter the Chitosan collected in a suitable holding facility (pond or tank) treat the runoff and filter it through a suitably sized sand filtration and discharge the effluent at a suitable location safe to the fish habitat adjacent to the project. Anticipated items include mobilization to the project and return to the rental company, a suitable filtration system, such as the Baker Tanks sand filter systems, a supply of Chitosan suitable for the rainy season of the project (about 3 months) and a metering system to mix the Chitosan prior to filtration. The only known provider of such a system is the Natural Site Solutions Company with Baker Tanks sand filtration system. Representatives of Baker Tanks are Bill Benner (Sales Rep), Randy Preston (Operations Manager), & Tim Ferris (Regional Manager), phone 1-800-225-3712; and from Natural Site Solutions Company- John MacPherson (Senior Chemist) Chitosan Technical expert.

They can provide design and operational assistance. The U.S. Fish and Wildlife Service can provide monitoring of the effluent and reporting of the evaluation of this technology as part of the technology evaluation costs.

**Benefits:** The expected benefits include satisfactory prevention of sediment discharge into sensitive sites adjacent to highway construction, reduced contamination of waterways and fish habitat, cost effectively meeting the resource agency requirements on discharges, and demonstrating an effective treatment for sediment control.

**Resources/Cost**: Construction staff in WFLHD will select a suitable project for the evaluation and provide the contract documents to rent and mobilize the necessary equipment. Advice will be provided from the Natural Site Solutions Company. Mobilization to and return from the project site of all necessary equipment and a suitable amount of Chitosan are eligible. Mobilization = $4000; Filter System = $9,000 per month; Chitosan = $20,000 per month; anticipate three months evaluation = $91,000 to rent the systems and materials. The U.S. Fish and Wildlife Service will provide a critical evaluation and report on the evaluation, as well as monitoring on site, as part of the TD project, estimated at $1,500 per month for three months for a total of $4,500. Total cost of the evaluation is $59,500.

**Duration**: The evaluation will begin as soon as possible during the season critical for the project selected and completed in six months.

**Organization/Method**: Contract Modification will be used to implement the rental and purchase of the equipment and supplies. A reimbursable agreement will be executed for the monitoring and reporting.

**Submitter**:


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